

Project Costs

Over the past year, the District and Howard University have worked with seven different nationally known firms to complete an estimate of the total NCMC project costs. The project cost team includes:

- Stroudwater Associates – District healthcare planning consultant
- The Lewin Group - Howard healthcare planning consultant
- Marshall Erdman – Howard architect
- Perkins and Will – Howard architect
- HKS – District architect
- Turner/Tompkins – District construction cost estimator
- BEK – District construction cost estimator

The resulting project cost estimate is \$424,336,000. This amount was used to determine the District's grant amount of no more than \$212,168,000 (or 50% of the cost estimate) to Howard University. Based on discussions with our respective advisors, the District and Howard are both very confident that the NCMC can be built for the estimated amount or less. However, even if the actual cost of the project were to increase beyond the \$424,336,000 level, the Exclusive Rights Agreement and the Grant Agreement stipulate that the District's contribution will not exceed \$212,168,000. Responsibility for completing the actual construction project will be Howard's.

To complete the cost estimate, Howard University's architects first developed a detailed facility program. The District hired cost estimators to determine the cost to build the program. Then we made a number of adjustments to the cost estimator figures to reduce the total cost of the project and determine the costs to be shared between the District and the University. The following is a detailed summary of this process and conclusions.

Howard University and its architects, in consultation with the District, developed an initial program for the NCMC based on industry norms and market studies completed by the Lewin Group (detailed in the July 2005 NCMC Proposal). The projected bed distribution, assuming all private beds (with the exception of the nurseries), is as follows:

NCMC Bed Distribution

| Department/Unit | Count |
|--------------------------------------|------------|
| NURSING | |
| Medical/Surgical Nursing Unit | 60 |
| Intensive/Critical Care Nursing Unit | 60 |
| Open Heart Surgery Cardiac ICU | 12 |
| Isolation Care Unit | 8 |
| Sleep Disorder Unit | 4 |
| WOMEN & CHILDREN | |
| Gynecological Nursing Unit | 6 |
| Post Partum Nursing Unit | 8 |
| Pediatric Nursing Unit | 10 |
| Pediatric Intensive Care Unit | 10 |
| LDR or LDRP Unit | 10 |
| Levels I & II Nursery | 10 |
| Level III Nursery - Neonatal ICU | 6 |
| SPECIALTY NURSING | |
| Observation/Clinical Decision Unit | 10 |
| Correctional Care Nursing Unit | 20 |
| Psychiatric Nursing Unit (Locked) | 8 |
| Psychiatric Nursing Unit (Open) | 8 |
| Total Facility Beds | 250 |

Source: Perkins & Will and Marshall Erdman

In addition, Howard University's architects projected square footage by department by allocating percentages of the total square footage of the proposed facility based on industry norms. They developed three options, a minimum square footage, an optimum square footage, and a program target.

Departmental Program Range

All values are in Building Gross Square Feet (BGSF)

| Department (with notes) | Minimum Area | Optimum Area | Program Target at 0.97 of Optimum |
|--|--------------|--------------|-----------------------------------|
| NURSING | | | 99,328 |
| Medical/Surgical Nursing Unit | 32,880 | 36,000 | |
| Intensive/Critical Care Nursing Unit | 44,880 | 48,000 | |
| Open Heart Surgery Cardiac ICU | 8,976 | 9,600 | |
| Isolation Care Unit | 5,984 | 6,400 | |
| Sleep Disorder Unit | 2,200 | 2,400 | |
| WOMEN & CHILDREN | | | 43,553 |
| Gynecological Nursing Unit | 3,750 | 3,900 | |
| Post Partum Nursing Unit | 5,000 | 5,200 | |
| Pediatric Nursing Unit | 6,250 | 8,000 | |
| Pediatric Intensive Care Unit | 7,500 | 8,000 | |
| LDR or LDRP Unit | 11,000 | 8,000 | |
| Levels I & II Nursery | 2,300 | 7,000 | |
| Level III Nursery - Neonatal ICU | 1,950 | 4,800 | |
| SPECIALTY NURSING | | | 31,525 |
| Observation/Clinical Decision Unit | 5,500 | 5,500 | |
| Burn Intensive Care Unit | 0 | 0 | |
| Rehabilitation (licensed) Nursing Unit | 0 | 0 | |
| Correctional Care Nursing Unit | 15,000 | 16,000 | |
| Psychiatric Nursing Unit (Locked) | 5,200 | 6,000 | |
| Psychiatric Nursing Unit (Open) | 4,800 | 5,000 | |
| DIAGNOSTIC & TREATMENT | | | |
| EMERGENCY | 48,813 | 49,700 | 51,701 |
| Ambulance Services | 3,600 | 3,600 | |
| AMBULATORY CARE | 7,500 | 7,500 | 7,275 |
| AMBULATORY SURGERY | 17,000 | 25,000 | 30,070 |
| Delivery (C-Section) | 5,500 | 6,000 | |
| Birthing Center | 0 | 0 | |
| SURGERY | 39,568 | 40,150 | 38,946 |
| DIAGNOSTIC IMAGING | 30,069 | 35,150 | 34,096 |
| LABORATORY | | | 16,733 |
| Reference Laboratory | 10,000 | 10,500 | |
| Decentralized Laboratories | 4,500 | 4,500 | |
| Morgue | 2,000 | 2,250 | |
| CARDIOLOGY SERVICES | | | 6,018 |
| Cardiac Catheterization | 2,400 | 2,580 | |
| Catheterization Prep/Recovery | 384 | 384 | |
| Non-Invasive Diagnostic and Testing | 384 | 300 | |
| Pulmonary Function Testing | 360 | 240 | |
| Open Heart Surgery | 2,616 | 2,700 | |
| ONCOLOGY SERVICES | | | 50,440 |
| Radiation Therapy | 21,250 | 46,250 | |
| Infusion Therapy | 2,000 | 2,000 | |
| Diagnostic & Testing | 3,750 | 3,750 | |

| | | | |
|----------------------------------|----------------|----------------|----------------|
| THERAPIES | | | 17,218 |
| Respiratory Therapy | 2,500 | 2,500 | |
| Physical Therapy | 5,500 | 5,500 | |
| Occupational Therapy | 2,000 | 2,000 | |
| Speech & Audiology | 1,500 | 1,500 | |
| Activities of Daily Living (ADL) | 1,500 | 1,250 | |
| Recreation Therapy | 1,500 | 1,250 | |
| Kidney Dialysis | 2,000 | 3,750 | |
| CLINICS (not in M.O.B.) | | | 27,888 |
| Clinics | 6,250 | 6,250 | |
| Clinics with offices | 10,500 | 10,500 | |
| Specialty Clinics | 10,500 | 12,000 | |
| SUPPORT | | | |
| DIETARY/FOOD SERVICE | 16,250 | 18,750 | 18,188 |
| CENTRAL STERILE SUPPLY | 3,750 | 4,500 | 4,365 |
| MATERIALS MANAGEMENT | 7,500 | 8,750 | 8,488 |
| PHARMACY – INPATIENT | 4,500 | 4,500 | 4,365 |
| PHARMACY – OUTPATIENT | 2,000 | 2,000 | 1,940 |
| HOUSEKEEPING | 4,500 | 5,000 | 4,850 |
| MAINTENANCE/BIO MEDICAL | 2,500 | 3,000 | 2,910 |
| ENGINEERING ADMINISTRATION | 2,000 | 2,500 | 2,425 |
| SECURITY | 750 | 750 | 728 |
| INFORMATION SYSTEMS | 1,250 | 1,250 | 1,213 |
| LAUNDRY | 5,000 | 5,500 | 5,335 |
| EDUCATION | | | |
| EDUCATION & CLASSROOMS | 6,250 | 6,250 | 6,063 |
| AUDITORIUM (Movie Theater) | 6,000 | 6,250 | 6,063 |
| PUBLIC HEALTH EDUCATION | 6,250 | 6,500 | 6,305 |
| ADMINISTRATION | | | |
| ADMINISTRATION | 3,750 | 5,500 | 5,335 |
| NURSING ADMINISTRATION | 2,500 | 2,500 | 2,425 |
| ADMITTING | 2,250 | 2,250 | 2,183 |
| BUSINESS OFFICE/FINANCE | 5,000 | 7,000 | 6,790 |
| MEDICAL RECORDS | 3,750 | 5,500 | 5,335 |
| HUMAN RESOURCES | 2,000 | 2,000 | 1,940 |
| QUALITY ASSURANCE | 2,000 | 2,250 | 2,183 |
| MEDICAL STAFF SERVICES | 1,250 | 1,250 | 1,213 |
| SOCIAL SERVICES | 1,250 | 170 | 1,698 |
| VOLUNTEERS | 1,250 | 1750 | 1,698 |
| RESEARCH | | | |
| MEDICAL RESEARCH | 5,000 | 5,000 | 4,850 |
| CLINICAL TRIALS | 1,250 | 3,750 | 3,638 |
| INFRASTRUCTURE | | | |
| PUBLIC AREAS | 8,750 | 10,000 | 9,700 |
| STAFF FACILITIES | 2,000 | 2,000 | 1,940 |
| COMMUNICATIONS/PBX | 850 | 750 | 728 |
| PLANT OPERATIONS | 56,250 | 62,500 | 60,625 |
| VERTICAL CIRCULATION | 18,750 | 18,750 | 18,188 |
| HORIZONTAL CIRCULATION | 31,250 | 31,250 | 30,313 |
| STAGING SPACE | 6,250 | 6,250 | 6,063 |
| FUTURE EXPANSION | 6,250 | 6,250 | 6,063 |
| UNASSIGNED | 6,250 | 6,250 | 6,063 |
| TOTAL HOSPITAL BGSF | 644,864 | 728,854 | 706,988 |

Source: Perkins & Will and Marshall Erdman

The District then worked with two construction firms skilled at providing detailed cost estimates for hospital construction projects, Turner/Tompkins and BE&K. The two firms each independently developed cost estimates, which were within five percentage points of each other. They then worked together to agree on a “consensus” cost-per-square-foot estimate for each of the major components of the NCMC. The firms also agreed on a projected level of inflation between October 2005 and the time the NCMC project will be priced for construction, in 2007.

To reach a total cost to be shared between the District and Howard University, we made a number of adjustments to the Cost Estimators’ figures, including several major design changes to reduce total project costs.

First, we eliminated underground parking in favor of a smaller, 1000-space above-grade parking structure. The traffic study commissioned by the District and completed by Parsons Brinckerhoff found that a number of comparable hospitals in urban areas, including the George Washington Hospital facility in DC, have 1000 parking spaces or fewer.

COMPARABLE HOSPITAL PARKING ANALYSIS

| Hospital Name | George Washington University Hospital | Howard University Hospital | California Pacific Medical Center - Davis Campus* | Maryland General Hospital | Northwest Hospital & Medical Center | Proposed NCMC |
|---|---|----------------------------|---|---------------------------|-------------------------------------|----------------|
| Location | Washington, DC | Washington, DC | San Francisco, CA | Baltimore, MD | Seattle, WA | Washington, DC |
| Beds** | 371 | 482 | 341 | 300 | 281 | 250 |
| Parking spaces | 1,083 | 1,575 | 333 | 800-1000 | 1,078 | 1,500 |
| Spaces/Bed | 3.26 | 5.41 | 0.98 | 3.33 | 3.84 | 6.00 |
| Parking structures (occupants) | 1 (patients/ visitors/ students/ staff) | 2 (staff) | 1 (all) | 2 (patients/ visitors) | 1 (all) | 1 (all) |
| Underground structures | 0 | 0 | 0 | 0 | 0 | 1 |
| Surface Lots | 0 | 4 (visitors/ staff) | 0 | 0 | 7 (6 staff, 1 patients) | 0 |
| Nearest rail station (blocks) | 0 | 2 | N/A | 2 | N/A | 1 |
| Bus lines servicing facility | 10 | 7 | 3 | 8 | 1 | 6 |
| Transit share (employees, %) | Unknown | Unknown | 19 | Unknown | 8 | N/A |
| Carpooling /Vanpooling share (employees, %) | Unknown | Unknown | 19 | Unknown | 20 | N/A |

Source: Parsons Brinkerhoff

Given NCMC's location near a metro station and six major bus routes, it is expected that most employees will take public transportation. It is also expected that many patients, especially the elderly, will arrive via medical vanpool transportation. In order to mitigate potential traffic impacts of the hospital, it is necessary to control the number of parking spaces and encourage public transportation. In addition, we decided to construct a surface garage immediately to the East of the NCMC across the Hill-East River Road instead of an underground garage to further reduce costs. The City Administrator's Office requested the use of 525,000 square feet of Sports and Entertainment Commission land immediately adjacent to the NCMC site for the purposes of building a parking garage. The replacement of underground parking with a surface lot and the reduction of the number of parking spaces from 1500 to 1000 reduced the total cost of the NCMC, including soft costs, by \$33,450,000.

Second, we reduced the hospital square footage per bed. The original estimated size of the NCMC was 3100 square feet per bed for a total of 775,000 square feet, including atrium and retail space. As the team looked at comparable facilities built in the U.S. in recent years, we realized that this figure was higher than average. Very few new academic medical centers have been built from scratch in the US in the past decade. The following are the most relevant comparables identified by the team:

COMPARABLE TEACHING HOSPITAL PROJECTS

| Facility | Location | Beds | Square Feet | SF/bed |
|---|-----------------|-------------|--------------------|---------------|
| National Capital Medical Center - Original design | Washington DC | 250 | 775,000 | 3,100 |
| UCLA- Westwood Campus | Los Angeles, CA | 525 | 1,200,000 | 2,286 |
| Arrowhead Regional Medical Center | Colton, CA | 383 | 920,000 | 2,402 |
| Cook County Hospital | Chicago, IL | 464 | 1,300,000 | 2,802 |
| Unidentified Case Study | Unidentified | 560 | 1,310,000 | 2,339 |

Source: Marshall Erdman/Perkins & Will; Turner/Tompkins

We found that the average square foot per bed of the identified teaching hospital projects was roughly 2400. As a result, the team decided to reduce the square footage per bed of the NCMC. By eliminating the atrium and retail space, we were able to bring square feet per bed down to 2800. We then further reduced the size of the hospital facility by imposing an additional cap on square footage, down to 2400 square feet per bed, or a total of 600,000 square feet. This cap will essentially function as a budget for the hospital, by necessitating a final design that meets the size constraint. We feel that this size is attainable, given the comparables. The total cost savings from elimination of atrium and retail space and reduction of square feet per bed to the 2400 benchmark was \$69,552,875, including soft costs.

Third, we subtracted out the costs that will be borne wholly by Howard University. Of the total cost of the Medical Center, the District and Howard have agreed that the shared costs will include the hospital, the parking structure, and “soft costs” of the hospital and parking, such as architectural and engineering fees, furnishings, medical equipment, and administration. Howard University has agreed to separately fund the medical office and research portions of the medical center.

Finally, we made a small technical adjustment to subtract a portion of the streetscape and city park costs added by the cost estimators, which are already reflected in the Anacostia Waterfront Corporation’s site preparation budget.

A summary of the major cost reductions due to design changes is as follows:

**NATIONAL CAPITAL MEDICAL CENTER
COST REDUCTIONS**

Cost reductions, including soft costs

| | |
|----------------------------|-----------------------|
| Parking* | \$ 33,450,000 |
| Atrium/retail** | \$ 17,171,000 |
| Square Footage reduction** | <u>\$ 52,381,875</u> |
| Total Reductions | \$ 103,002,875 |

* Smaller (1000 space) surface garage to replace underground parking

** To be eliminated

The total shared project costs of the NCMC, including the above adjustments, are expected to be \$381,936,000. This estimate reflects expected inflation through 2007, the year that the construction contract will be bid. Each party has agreed to contribute 50% of this amount, or \$190,968,000 each. In addition, each party will set aside \$21,200,000 as a 20% design contingency (figured off of hard costs). The purpose of this contingency is to provide some cushion in the event of design changes. In addition, the cost estimators built a 3% contingency into their cost estimates as a construction contingency. The District will contribute all or a portion of the contingency only if the total shared project costs are more than \$381,936,000 and Howard University contributes an equal sum of contingency funds. The comparison of the original cost estimate and the revised cost estimate is as follows:

COST ESTIMATE COMPARISON OF ORIGINAL AND REVISED DESIGNS

| Design Element | Original Assumption | Unit Cost | Original Estimate | New Assumption | Revised Estimate |
|--|-----------------------|--------------|-----------------------|----------------------------------|----------------------|
| 250-Bed Hospital | 705,000 SF | \$325/SF | \$ 229,125,000 | 600,000 SF | \$195,000,000 |
| Parking Garage | 1500 cars underground | \$30,000/Car | \$ 45,000,000 | \$15,000/Car 1000 car surface | \$ 15,000,000 |
| Retail Shell Space | 40,000 SF | \$160/SF | \$ 6,400,000 | eliminated | \$ - |
| Atrium | 30,000 SF | \$300/SF | \$ 9,000,000 | eliminated | \$ - |
| Streetscape Allowance | 14 Acres | | <u>\$ 2,000,000</u> | | <u>\$ 2,000,000</u> |
| TOTAL - Construction Cost: | | | \$ 291,525,000 | | \$212,000,000 |
| Soft Costs | | | | | |
| Architecture/Engineering | 10% | | \$ 29,152,500 | | \$ 21,200,000 |
| Hospital Equipment | 35% | | \$ 80,193,750 | | \$ 68,250,000 |
| Furniture Fixtures & Equip | 7% | | \$ 16,038,750 | | \$ 13,650,000 |
| Owner Administration | 1.5% | | <u>\$ 4,372,875</u> | | <u>\$ 3,180,000</u> |
| TOTAL - Soft Costs: | | | <u>\$ 129,757,875</u> | | <u>\$106,280,000</u> |
| PROJECT TOTAL IN 2005 DOLLARS* | | | \$ 421,282,875 | | \$318,280,000 |
| INFLATION TO 2007 | 20% | | <u>\$ 84,256,575</u> | | <u>\$ 63,656,000</u> |
| PROJECT TOTAL IN 2007 DOLLARS* | | | \$ 505,539,450 | | \$381,936,000 |
| DISTRICT SHARE OF PROJECT COSTS (50%) | | | \$ 252,769,725 | | \$190,968,000 |
| DESIGN CONTINGENCY | | | | | |
| | 20% | | \$ 29,152,500 | | \$ 42,400,000 |
| DISTRICT SHARE OF CONTINGENCY (50%) | | | \$ 14,576,250 | | \$ 21,200,000 |
| TOTAL PROJCT COSTS PLUS CONTINGENCY | | | \$ 534,691,950 | | \$424,336,000 |
| MAXIMUM TOTAL DISTRICT CONTRIBUTION | | | \$ 267,345,975 | | \$212,168,000 |

Source: Consensus Cost Estimate was developed by Turner/Tompkins and BE&K based on the preliminary plans and space program developed by Marshal Erdman/Perkins & Will.

Since we completed the above estimate and Howard and the District agreed on a fixed District grant amount, we learned that it would be impossible to build a surface parking garage on federal land adjacent to Reservation 13. As a result, the NCMC will now include a 1000-space underground garage. This shift back to an underground garage to a surface garage will increase project costs, including soft costs and inflation, by about \$20 million. The District did not change its grant contribution amount as a result of this design change. The District's share of this cost increase (about \$10 million) will be easily accommodated within the District's contingency of \$21,200,000 million.

District Site Preparation and Infrastructure and Costs

According to the signed Exclusive Rights Agreement, the District is responsible for preparing the 9-acre Reservation 13 site for construction of the National Capital Medical Center (NCMC) and constructing the surrounding public utilities. The District will be responsible for 100% of these site and infrastructure costs. This work will be completed by the Anacostia Waterfront Corporation (AWC), the entity charged with the responsibility of revitalizing the Anacostia waterfront. Site preparation activities include demolishing existing buildings, abandoning and removing underground utilities, remediating any soil contamination as well as completing preliminary grading. The construction of public infrastructure will include final site grading, and construction of utilities, streets, sidewalks and public parks.

Prior to the proposal to construct the NCMC, the AWC was engaged in the necessary site assessment activities required for site redevelopment. The following represents the due diligence completed by AWC regarding site redevelopment:

- Phase I Environmental Assessment
- Concept Grading Plan
- Concept Utility Relocation Plan
- Concept Street, Streetscape and Public Realm Plan
- Preliminary Cost Estimate for R13 Infrastructure Elements
- Site Engineering and Topographic Survey
- NCMC Project Infrastructure Analysis

Based on the above studies, the AWC has estimated the site infrastructure improvements **directly related to the NCMC project** to be as follows:

NCMC Site Preparation and Infrastructure Costs* **(Millions)**

| | |
|--|----------------|
| Hazardous Material Demolition | \$1.93 |
| Building Demolition | \$2.55 |
| Non-Building Related Hazardous Material Demolition | \$0.61 |
| Site Demolition | \$0.71 |
| Site Grading | \$1.93 |
| New Street Construction | \$4.74 |
| Metro Streetscape Improvements | \$1.93 |
| Street Lighting | \$0.26 |
| Project Soft costs | \$3.96 |
| Project Contingency Costs | \$2.97 |
| TOTAL | \$21.59 |

*Estimates reflect projected inflation to date of construction

Of this total, \$5.81 million is expected to be spent in FY06 and the other \$15.79 million in FY07. The Council has already appropriated \$9 million in the FY2005 and FY2005 Supplement Budget Acts for Reservation 13 site infrastructure, of which \$6 million is been earmarked for the hospital site (an additional \$3M is earmarked for the extension of Massachusetts Avenue on another portion of Reservation 13). The balance of the NCMC site preparation and infrastructure costs will be requested in the FY07 capital budget process.

Sources: Site infrastructure estimate based on *Reservation 13 Infrastructure Cost Estimate* prepared by EEK Architects and G&O Consulting Engineers with professional quality assurance review by Accucost Inc. Estimate based on *Reservation 13 Concept Grading and Infrastructure Layout* prepared by G&O and *Reservation 13 Phase I Environmental Analysis* prepared by G&O. All materials prepared in 2004 for the District of Columbia, Office of Planning – Anacostia Waterfront Initiative.